MINUTES
First meeting PSWP-1&2 RF Specialist Group (teleconference)
June 28, 1990

Dick Green proposed the Planning Group study the issue of venue selection in relation to representative conditions including cable system performance. Jules Cohen stated that venue selection should represent common conditions rather than extremes. Charles Heuer expressed reservations about Planning Group involvement at this time. Dick believes venue selection is a proper function of the Planning Group. Some dissatisfaction was expressed with Washington as the only venue. Jack Kean stated that a more representative location would include a central core of high or medium high buildings with the transmission plants located at the periphery of the metropolitan area. It was agreed that this configuration is common to cities of varying sizes throughout the country. The planning group will try to deal with the venue issue as quickly as possible.

Several issues were discussed without resolution:

1) There seems to be some confusion concerning the definition of field testing. Should the tests include satellite distribution or not? Some (especially the cable representatives) members of the group felt that the tests should be an end to end evaluation including satellite delivery to broadcast stations, broadcast transmission and cable transmission. Others felt that the tests would be restricted to tandem broadcast and cable transmission.

2) There is also a need to clarify the criteria for selection of venues for field tests. How many sites shall be selected? Is Washington, D.C. acceptable if only one site is chosen? What are the attributes for selection of field test venues?

Dick Green said he will seek guidance on these issues.

The meeting was concluded at 6:20 PM. Jack Kean took the minutes.

Advisory Committee on Advanced Television (ATV) Service

DRAFT

MINUTES
Second Joint Meeting of PS/WP-1&2
July 6, 1990

The meeting was called to order by Chairman McMann at 10:00AM Participating: Max Berry, Charles Heuer, Jack Kean, Tom Keller, Renville McMann, Victor Towil, Tony Uyttendaele and Tom Watson.

The minutes of the first meeting were approved as written. Some attendees did not receive copies of the minutes by mail.

Jack Kean reported on the June 27th meeting of the PS/WP-1&2 Field Testing Specialist Group. As a result of subsequent discussion of this subject, the Subcommittee developed the following statements:

1) No final report and no system selection should be made based on objective laboratory testing alone. Field tests must be performed before a recommendation to the Federal Communications Commission is is made.

2) Field site selection must substantiate laboratory results by including multipath with multiple long and short term reflections and ignition and power line interference as well as co, adjacent, and taboo interferences (ATV-NTSC, NTSC-ATV)."

3) It is considered highly desirable to pass the RF signal through a cable system as a part of field testing."

4) In accordance with the statement issued March 10, 1990 by the FCC. HDTV systems should receive first priority for field testing.

Charles Rhodes has requested WP-1 delete the chroma resolution measurement requirement in Section 6.2. He proposes to test chroma channel transit response by introducing a chroma only transition in the test signal.

In response to this request, WP-1&2 stated: "We recognize the difficulty of obtaining the MTF curves requested in attribute 2.2 without obtaining internal signals from proponent equipment. Because of the importance of this attribute, indirect methods may be employed to quantify chroma response." It was pointed out that the value to be measured is for the smallest object that can be reproduced in color.

Attribute 6.4 "Susceptibility To Interference." was modified to add "picture and sound" wherever the word "picture appears.

In other issues, Charles Heuer pointed out that the attribute list has not been updated to incorporate changes from the last meeting.

The meeting was adjourned at 1:10 PM. In the absence of the Secretary, Jack Kean took the minutes.

FCC NEWS
FEDERAL COMMUNICATIONS COMMISSION
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4586

This is an unofficial announcement of Commission action. Release of the full text of a Commission order constitutes official action. See MCI v. FCC, 515 F 2d 385 (D.C. Circ 1975)

Report No. DC-1702 ACTION IN DOCKET CASE August 28, 1990

FCC DECISION ON ATV EXPLAINED AND DISCUSSED
(MM DOCKET 87-268)

The Commission has issued a Report and Order explaining its March 21, 1990, decision on selection of an Advanced Television (ATV) system.

In a Public Notice adopted on March 21, 1990, the Commission stated that it had decided to select the "simulcast" option for Advanced Television (ATV) Service. Under this approach, the Commission will select a 6 MHz high definition television system that is independent of the currently used "NTSC" (National Television Systems Committee) TV transmission system.

In the Public Notice, the Commission also indicated that it did not intend to give further consideration to ATV systems that required additional spectrum to augment the existing 6 MHz channel used for broadcast television. The Commission stated, however, that it would leave open the possibility of considering an extended definition television (EDTV) system. Finally, the Commission noted it would issue a Report and Order explaining the basis for these decisions.

In the Report and Order the Commission said that selection of a simulcast system would offer the potential for significantly greater improvement in the quality of television picture and audio performance than NTSC compatible systems. Such a system is expected to be viable over the long term by permitting the introduction or future changes and improvements in a timely and non-disruptive manner. Further, simulcast systems are not constrained by the limitations inherent in the NTSC technology.

The Commission stated that a simulcast system will also be spectrum efficient and facilitate the implementation of ATV service. Such a system will transmit the increased information of an HDTV signal in the same 6 MHz channel space used in the current television channel plan. This will allow broadcasters to offer HDTV at the earliest possible date and consumers to enjoy the greatest degree of initial improvement in the quality of their TV picture and sound. It will also eliminate confusion for consumers about which type of receiver to purchase.

(over)

The Commission noted that, at this time, the individual candidate simulcast, or HDTV, systems are still undergoing final development. It said it did not have full information on the performance attributes of any of these systems, and, therefore, it was not taking a position on the desirability of any particular simulcast system as the standard to choose.

The Commission said it would keep open the possibility of adopting an EDTV system. For example, it is possible that a breakthrough development in a fully digital simulcast system may occur that would require additional development time. Alternatively, it is possible that an EDTV system could prove to provide quality similar to that of current HDTV systems and thereby be more cost effective for both broadcasters and consumers. In view of these possibilities, the Commission said, it would continue to examine all aspects of 6 MHz EDTV technologies, including their quality, technical attributes, potential for consumer acceptance and cost effectiveness. It said that after the final report from the testing program is available, it will reexamine the matter of how to implement ATV service. At that time, if the Commission finds that the single step simulcast approach for implementation is not the appropriate course of action, it may, alternatively, consider an EDTV system or some approach that would involve selection of both simulcast and EDTV standards.

In conjunction with these policy decisions, and its goal to select a system as promptly as possible, the Commission said it was expediting the completion for its program for testing and evaluation of the candidate ATV systems. It has directed the staff to work closely with the testing laboratories and is in the process of formulating, with the Advanced Television Test Center and Cable Labs, a program of active participation in the testing process. To this end, it has requested that the Advisory Committee make any test data it generates available to the FCC as soon as it is produced. The Commission said its goal was that, through the collective efforts of the Advisory Committee and FCC staff, a final report with recommendations can be completed by autumn 1992.

Finally, the Commission said it intends to maintain a flexible position with respect to new ATV developments that offer important new benefits and which are in a sufficiently concrete state of development to be considered with the existing systems. It recognized that other parties in addition to those currently participating in the test program are working on system designs and that it is possible that some of these systems could offer features superior to those already scheduled for testing. The Commission does not want to foreclose the possibility of considering any of these systems. Thus, with the assistance of the Advisory Committee, the Commission will review carefully but quickly any such new developments early in 1992. If it finds any new systems that are sufficiently developed to be tested, it will supplement the testing schedule to accommodate them.

The Commission also noted that this <u>Report and Order</u> addresses only a limited number of issues pertaining to technical standards. It said it would address other issues in subsequent actions in this proceeding.

Action by the Commission August 24, 1990, by First Report and Order (FCC 90-295). Commissioners Sikes (Chairman), Quello, Marshall, Barrett, and Duggan.

-FCC-

News Media contact: Rosemary Kimball at (202) 632-5050.
Office of Engineering and Technology contact: Alan Stillwell at (202) 653-8162.

PS/WP1&2-071

JOINT MEETING NOTICE

FCC ADVISORY COMMITTEE ON ADVANCED TELEVISION SERVICE PLANNING SUBCOMMITTEE, WORKING PARTIES ONE AND TWO

8 OCTOBER 1990
10:00 AM

NBC
30 ROCKEFELLER PLAZA
MEZZANINE CONFERENCE ROOM C
NEW YORK, NEW YORK

DRAFT AGENDA

1. Call to order by the Chairman

2. Introductory Remarks

3. Approve agenda

4. Possible additional attributes and test requirements (see note below).

5. New Business

6. Adjournment

NOTE: We have been asked by the Planning Subcommittee chair to consider the effects of preprocessing (such as picture manipulation and standards conversion) on input signals to an ATV system. We have also been asked to consider the effects of reasonable amounts of noise on an input signal.

PS/WP1&WP2-072

JOINT MEETING OF
FCC ADVISORY COMMITTEE ON ADVANCED TELEVISION SERVICE [ATS]
PLANNING SUBCOMMITTEE
WORKING PARTY 1 [PS/WP1]
ON ATS TECHNOLOGY ATTRIBUTES AND ASSESSMENTS
AND WORKING PARTY 2 [PS/WP2]
ON ATS TEST PLANNING

8 October 1990

1. The meeting was called to order by WP1 Chairman, Ren McMann at approximately 10:07 a.m., on 8 October 1990, in Conference Room C, NBC, 30 Rockefeller Plaza, New York, NY 10112.

Those present were:

Ren McMann, Chairman, WP1
Stan Baron, Vice-Chairman, WP1 (NBC)
Tom Keller, Vice-Chairman, WP1
Jim Gaspar (Panasonic)
Alan Godber (NBC)
Bronwen Jones (CableLabs)
Jack Kean (ConnETV)
Jeff Krauss (GI)
Christopher Tobin (Spanish Broadcasting System)

2. Introductory Remarks:

The Chair read the statement of work to be accomplished as contained in a letter, dated 7 September 1990, from J. Flaherty, Chair of Planning Subcommittee (See PS/WP1&WP2-073, attached).

3. The draft agenda (PS/WP1&WP2-071, attached) was accepted.

4a. Additional Attributes

The Working Party reviewed documents pertaining to the issues being investigated submitted by B.Dickens [CBS] (See PS/WP1&2-074, attached) and A.Godber [NBC] (See PS/WP1&2-075, attached).

[A letter was received from Zenith after the meeting had closed on the same issues. A copy of the Zenith letter is attached as PS/WP1&2-077.]

After discussion, the members agreed to modify the attributes list section **1.4 Artifacts** and to add the following:

1.4.1 The performance of ATV systems which have been spatially or temporally prefiltered including the use of motion detection.

1.4.2 The performance of ATV systems in response to input signals having random noise, clock noise, etc. superimposed on them.

B.Jones, representing SS/WP2, questioned whether these attributes were important enough to be added to the official list. There was consensus within those present that the two attributes warranted being listed.

Some members present raised concerns about the ability of the ATTC to test these attributes considering costs and time involved. The Working Party decided that it was inappropriate for it to make a decision on this question.

4b. System Field Testing.

J.Kean reported on the work in SS/WP2 on the subject of field testing. (See PS/WP1&2-076, attached). In summary, the Ad-hoc Alternative Site Search Group is seeking a full-power test with an antenna designed for broadcast purposes. Testing is planned for late 1991 or early 1992.

Signals originating in NTSC and the candidate ATV system will be alternately switched onto the antenna. NTSC will be used as a control signal for comparison.

The question was raised that the field test of the "candidate system" appeared to be scheduled prior to selection of the candidate. There is an expectation that the field testing schedule will be revised.

There was a discussion on the appropriateness of Washington as the test site and the need to have more than one site. There was consensus to add two more attributes to the list in **Section 6.9 Transmission Field Testing** as follows:

6.9.1 At least one (1) location exhibiting average amount of difficulty, and

6.9.2 At least one (1) location considered "difficult".

Questions were raised as to whether the issues of testing for cable systems and satellite systems were adequately covered. There was agreement that the current list

is adequate.

On the issue of coverage, J.Kean did not believe that coverage was going to be a part of the field testing program. Broadcasters present believed that this was an important issue.

J.Kean was assigned the task of liaising with ATTC to provide specific descriptions on how each of the attributes would be tested.

J.Kean reported that the field tests are designed to obtain data on system performance in response to multi-path delays, airplane flutter, weather conditions, and the like. The testing will also be directed to the UHF band. There are currently no plans to test in the low-band VHF spectrum. The broadcasters present believed that this was an important issue.

5. The meeting was adjourned.

ATTACHMENTS: PS/WP1&2 - 071, -073 through -077.

Advanced

Advisory Committee on Advanced Television (ATV) Service

Doc. No. PS/W1 & WP2-073

Date September 7, 1990

Dear Ren and Dick:

The attached letter from the CBS member of FCC ADCOM PS/WP-6 raises an important issue that relates to the objective testing of proponent ATV Systems.

As a matter of highest urgency, please determine if such tests should be listed as "attributes" and, if so, please draft suitable "test procedures" to be forwarded to FCC ADCOM SS/WP-2.

By copy of this memorandum, Messrs. Fannon, Tanner, and Richer are asked to comment directly to Messrs. McMann and Green.

Best regards,

Joseph A. Flaherty
Chairman, Planning Subcommittee
FCC Advisory Committee on
Advanced Television Service

Mr. Renville McMann
Chairman, FCC ADCOM PS/WP-1
963 Oenoke Ridge
New Canaan, CT 06840

Mr. Richard Green
Chairman, FCC ADCOM PS/WP-2
President & Chief Executive Officer
Cable Television Laboratories Inc.
1050 Walnut Street
Suite 500
Boulder, CO 80302

Att.

cc: Mr. Richard Wiley, Chairman FCC ADCOM
Mr. Lex Felker, Executive Director, ATTC
Mr. Craig Tanner, Chairman, FCC ADCOM PS/WP-6
Mr. Irwin Dorros, Chairman, FCC ADCOM SYSTEMS SUBCOMMITTEE
Mr. Mark Richer, Chairman, FCC ADCOM SS/WP-2

Advisory Committee on
Advanced Television (ATV) Service

Doc. No. _____

Date August 30, 1990

Dear Mr. Flaherty,

During the discussions in the Ad Hoc Groups of Planning Subcommittees Working Party 6 regarding the testing of the 1125/60 to 1050 and 525 line systems transconverter, it became apparent that some of the proponents of ATV systems using 1050 and 525 line source signals are very concerned that processing of the source signal would degrade the performance of their systems. This concern over the effect of the signal processing in a simple line converter raises the question of the effect of the normal signal processing done in program production; squeeze, zoom, picture rotation, slow motion, etc. would have on the performance of the proposed ATV transmission systems. It would appear advisable to include video source signals that have gone through similar processing in the ATV terrestrial broadcasting system test program.

The extent of the proponents concern was evident from their insistence on the use of perfect computer generated signal for testing the transconverter because television cameras might mask the effects of signal processing in the converter that could degrade the performance of their proposed systems. Of particular concern to these proponents were:

* the effect of concatenating motion compensation;

* the effect of filtering and re-sampling;

* the presence of aliasing components.

In the production and distribution of present day television programs extensive use is made of image processing techniques similar to those of concern to some of the ATV system proponents. With the advent of HDTV the use of these techniques will be more common. In addition, there will be extensive use of three dimensional data compression techniques because of the high data rate required for HDTV. Since the chosen ATV broadcast system will have to pass television signals that have been processed by these techniques and considering the concern of some proponents over the effect of image processing on the performance of their proposed systems it would appear desirable to include in the

ATV system test program, signals that have been through extensive processing such as would occur during a typical program production and distribution.

In the current television distribution system only the NTSC encoding standard is used for final link to the home. As a result it is quite simple to check the effect of any image processing system on the picture that will be received in the home. In fact, a test using NTSC receivers is included in the ATV test plan to cover NTSC compatibility issues where appropriate. In the future when HDTV is introduced, there maybe multiple systems for the final link to the home making it difficult and undesirable to test the acceptability of a proposed image processing system by its impact on all of the distribution systems. The ATV distribution systems selected should be those that can operate in the presence of processing artifacts without introducing further subjective degradation.

CBS therefore, proposes that the Planning Subcommittee take the necessary steps to include some processed signals in the ATV terrestrial broadcasting test program.

Best regards,

Bernard L. Dickens

Bernard L. Dickens
Member Advisory Committee
Planning Subcommittee WP-6

Joseph A. Flaherty
Vice President
General Manager
Engineering & Development
CBS INC.
555 West 57 Street, 10th. Fl.
New York, NY 10019

cc Craig Tanner

CBS
OPERATIONS AND
ENGINEERING
A Division of CBS Inc
555 West 57 Street
New York, New York 10019
(212) 975-4321

Dear Ren,

October 3, 1990

As digital technology has advanced, the ability to generate television pictures that utilize the full extent of the spatial and temporal response capabilities of television systems is becoming more common. Several years ago, the Digital Video Interim Working Party of CCIR Study Group 11 was tasked with generating sequences of still and motion pictures to be used in evaluating the performance of digital compression systems for use in inter-studio transmission systems for CCIR Rec. 601 signals. One of the sequences chosen, over the objection of some members who felt it was too taxing since it was very unlikely to occur in a real television situation, was a sequence call "Diva with noise". This sequence starts out as a full picture of a woman with a typical background that gradually is squeezed to fill only a small area in the center of the picture. The remaining area of the picture is filled with random noise. Shortly after the meeting where the use of this sequence was discussed, one of the committee members noticed a sequence on his local television that used a similar effect as a bumper to introduce a program. It is quite apparent that with the availability of digital video effects generators, television pictures are no longer limited to pictures that are filtered by television cameras.

To add to the complexity of determining what is a reasonable picture content is the growing use of sophisticated digital devices such as standards converters and data compression systems. These devices make use of advanced motion adaptive techniques to retain the source resolution without sacrificing smoothness of notion. Since these devices are not perfect, they at times introduce artifacts in the output images. These artifacts may not be of sufficient magnitude to reject the pictures, and they may not even be visually apparent to any but the most expert of observers, but they can create spatial and temporal components that are not normally present in television images.

To resolve the dilemma of the need to set a performance requirement for pictures that cannot be defined a statement was added to the document on performance for data compression codecs by CCIR IWP 11/7. This statement requires that for signals that exceed the capability of the codec the degradation in performance must be graceful.

Planning Subcommittee Working Party 1 can answer the request of the Planning Subcommittee Chairman by adding an attribute relating to the need to gracefully handle all source signals that fall within the specification boundaries for the source system. This would include noisy source signals, since as shown previously, noise can be a part of the desired signal.

A possible test method for this attribute would be to use a signal such as the moving zone plate to locate signal content that could cause a given system problem and then to design a video test image sequence that exercises the problem area. The special test sequence would be passed through the system under test and the impaired picture at the output would be observed and rated by expert viewers. Since the same procedure would be followed for each system under test, the requirement to test all of the systems in the same manner would be met.

Another area that I do not think is covered by an attribute is what happens when switching between channels with a receiver designed for the ATV system. This problem was discussed at the last meeting of Systems Subcommittee WP-1. A similar situation exists when there is an interruption in the input signal to the receiver. Experience with other data compression systems would lead me to believe that there will be a period of picture loss until the repeat cycle of the transmitted data is completed. In ATV systems that exhibit this problem a means must be provided to cause this effect to be graceful.

I hope this discussion will expedite the work of your Working Party.

Best regards,

Bernard L. Dickens
Senior Staff Scientist
(212) 975-2003

Mr. Renville H. McMann Jr.
Chairman PSWP-1
963 Oenoke Ridge
New Cannan, CT 06840

copies to:

J. A. Flaherty, R. G. Streeter

Operations & Technical
Services
National Broadcasting
Company, Inc.

30 Rockefeller Plaza
New York, NY 10112
212 664-7485

Alan S. Godber
Director,
Advanced Development

NBC

PS/WP1&2-075

Mr. Renville H. McMann,
Chairman, PS/WP1 ACATS,
963, Oenoke Ridge,
New Canaan, CT 06840

October 8th, 1990

Dear Ren,

Below, please find a contribution from NBC on the subjects previously identified for consideration at the next joint meeting of PS/WP1 and PS/WP2 on October 8th, 1990.

1. Camera Noise and Other Production Equipment Artifacts and its impact on ATV Transmission Systems

   Noise in a source may be random noise, or coherent noise, the latter being of various types. This noise can be aggravated by various processes, particularly analog processing. Digital processes can introduce errors, as a result of error concealment, error correction, overload of the channel, or artifacts produced by signal compression techniques.

   Camera noise of the random variety will be present in varying degrees. It will be present in new cameras designed for ATV, and in existing cameras used for upconversion from NTSC and from PAL.

   A transmission system must be able to satisfactorily process images in the presence of random noise and a certain level of coherent noise such as clock noises from cameras. It must also be able to handle noise and artifacts from other production equipment.

2. Standards Conversion and its impact on ATV Transmission Systems

   Frame rate conversion will be used for a portion of the TV images to be transmitted. Motion artifacts will occur from frame rate change, and may impact the transmission system performance. If the source is interlace, further artifacts will probably occur.

   Line rate conversion may be used, if line rate of production standard of choice is not same as transmission standard. If source is interlace, then artifacts will occur, and may have an impact on the transmission system.

Upconversion from NTSC may be used, in which case artifacts will occur as in the line rate conversion case, assuming that the same frame rate is used in NTSC and ATV.

Upconversion from PAL may be used, in which case artifacts will occur as in the frame rate and line rate conversion case.

In the HDTV production plant downconversion to NTSC and PAL will be done. The impact on the NTSC and PAL images require consideration, but these are more affected by the choice of production standard.

All of these degradations would be reduced when a progressive scan HD production format is used.

A transmission system must be able to satisfactorily process these artifacts without magnifying them, or introducing additional artifacts of its own as a result of the conversion artifacts.

Hoping that these thoughts will be of assistance.

Yours Sincerely,

Alan S. Godber

ASG
10/8/90
apswp1d1/1-2

DATE: September 10, 1990

TO: Jules Cohen Chairman, SS/WP-2 Field Testing Task Force

FROM: Ad Hoc Alternative Site Search Group

SUBJECT: Report requested for September 12, 1990 meeting

At the August 13th Field Test Task Force meeting, concern was expressed that financial considerations could unnecessarily limit field testing when alternatives may exist to the Washington, DC site and to the utilization of existing available equipment. With this in mind, you appointed an ad hoc group to investigate these possible alternatives. This group, consisting of Jim Kutzner, Jack Kean, Harvey Arnold and Tom Keller, met on September 4, 1990. All of us agree that the test plan is well conceived in its present state of development. The concerns are as follows:

1) The highly directional characteristics of the proposed horn antenna may not duplicate multipath conditions that exist in an urban environment. In particular, long period ghosting from structures or terrain features behind the antenna may be absent.

2) The use of relatively low power may further limit long period ghosting since distant reflections may be lost in the noise floor.

3) The combination of low power and less than average antenna height may yield non-representative coverage results for digitally based ATV systems in Grade B areas.

3) A major shortcoming of the laboratory testing program and one of the main factors driving the need for field testing is the ability to generate and therefore determine the effect of multiple impairments on ATV systems under test. The number of impairments at a given receive location could be limited by a reduced scale test area.

4) Any test plan should duplicate as nearly as possible the ultimate operation envisioned. Terrain will vary with venue but most UHF stations share similar height, power and omnidirectional antenna patterns.

You requested day time testing availability for eight hours a day, five days a week, for at least a four month period at a date to be determined by the progress of lab testing. Our investigations were understandably limited by the difficulty of reaching decision makers during the summer months. However, we did achieve the following:

We have a definite commitment from public station WNEQ Channel 23 Buffalo, NY. The antenna and line are very recent with good height and power. The proximity to Canada may be of great advantage because of Canadian resources and interest in this project.

At least one Connecticut commercial station begins daytime operations in mid afternoon and would presumably be available. (WHAI-TV Channel 43 Bridgeport) No contact has been made at this point but Jack Kean will be glad to do so. In addition, Seattle WA has two open UHF assignments plus tower and tall building location potential. Several PBS stations are tentatively available including Channel 26 in Charlotte, North Carolina. It is also believed that arrangements for full power testing on both UHF and VHF can be made with other PBS stations during summer months.

The group understands that full power testing could be accomplished on CH-58 in Washington without interference to other stations. Nat Ostroff, President of Comark, has indicated his desire to make a 40 Kw klystrode transmitter available for such testing. Harry McKee, Vice President of Andrews Corp. has expressed interest in providing a antenna suitable for side mounting. These are not firm commitments but certainly worthwhile pursuing. This equipment could be employed either in Washington or at a venue with more representative height.

We urge that the test plan be written to allow change of both equipment and venue as circumstances dictate over time. We think that every attempt should be made to perform complete high power, omnidirectional testing for the reasons detailed above. If economics mandate only low power testing at the Washington site, we hope that some testing in Buffalo or other high power venue can be incorporated in the plan.

PS/WP1&2-077

ZENITH ELECTRONICS CORPORATION □ 1000 MILWAUKEE AVENUE □ GLENVIEW, ILLINOIS 60025-2493 □ (708) 391-7000

VIA FAX

October 8, 1990

Renville McMann, Chairman PS/WP1
c/o Alan Godber
NBC
30 Rockefeller Plaza
New York, N.Y., 10112
FAX: (212) 581-6687

Dear Ren,

We regret that Zenith cannot send a representative to the combined PS/WP1 & PS/WP2 meeting today in New York. The work and contribution of your group is vital for the selection of the best ATV system for the U.S.

According to the draft agenda sent out with today's meeting notice, you will be considering the addition of attributes which describe the effects of preprocessing and source noise on input signals to ATV systems. We are sending you this letter to express Zenith's support for testing ATV systems using both preprocessed images and images with source noise.

Preprocessing has become a common and important tool in television production. Inserts, special effects, editing, cuts, fades, etc., truly enhance the viewing experience of the public. Since these techniques can result in scenes which are not found naturally, it is totally possible that they may trigger artifacts from an ATV system which might otherwise go undetected. ATV systems are generally nonlinear systems which can react in surprising ways to unusual inputs.

The nonlinear processing of ATV systems can also respond in unusual ways to noisy inputs. To test this attribute, a single input signal should be tested with various degrees of additive noise and the results observed for the nature of a system's degradation.

We urge that your meeting come to the same conclusions and request that Zenith's opinion in this matter become a part the record for your meeting today.

Sincerely,

Ronald Lee

Ronald Lee

cc: C. Eilers - C. Heuer - W. Luplow

ATTRIBUTES/SYSTEMS MATRIX, REVISION 2

Section A: Attributes List

I. General Description (Proponent)

1. Compatibility
   - 1.1 NTSC Receiver
   - 1.2 VCR
   - 1.3 Channel
   - 1.4 Other ATV Systems

2. Transmission Scenario
   - 2.1 Number of channels required
   - 2.2 Channel Bandwidth
   - 2.3 Contiguous/Non-Contiguous

3. Terrestrial Implementation Scenarios

4. Intended Display Size/Viewing Angle (Measured)

II. System Attributes

1. ATV Image Issues
   - 1.1 Luminance spatial/temporal resolution
     - 1.1.1 Static Horizontal resolution - MTF curve
     - 1.1.2 Static Vertical resolution - MTF curve
     - 1.1.3 Static Diagonal resolution - MTF curve
     - 1.1.4 Dynamic Horizontal resolution - MTF curve
     - 1.1.5 Dynamic Vertical resolution - MTF curve
     - 1.1.6 Dynamic Diagonal resolution - MTF curve
     - 1.1.7 Graph of Samples/Frame vs Frame/Second rate
   - 1.2 Chrominance spatial/temporal resolution
     - 1.2.1 Static Horizontal resolution - MTF curve
     - 1.2.2 Static Vertical resolution - MTF curve
     - 1.2.3 Static Diagonal resolution - MTF curve
     - 1.2.4 Dynamic Horizontal resolution - MTF curve
     - 1.2.5 Dynamic Vertical resolution - MTF curve

1.2.6 Dynamic Diagonal resolution - MTF curve
1.2.7 Graph of Samples/Frame vs Frame/Second rate

1.3 Chromaticity/Colorimetry Characteristics
1.3.1 Color Difference Signals Axes
1.3.2 Transfer Characteristics

1.4 Artifacts
1.4.1 The performance of ATV systems which have been spatially or temporally prefiltered including the use of motion detection **(Rev.2)**
1.4.2 The performance of ATV systems in response to input signals having random noise, clock noise, etc, superimposed on them **(Rev.2)**

1.5 Transient Response

1.6 Aspect Ratio

1.7 Baseband Video Bandwidth

1.8 Subjective Assessment of Overall Picture Quality

2. Compatible NTSC Image Issues
2.1 Luminance spatial/temporal resolution
2.1.1 Static Horizontal resolution - MTF curve
2.1.2 Static Vertical resolution - MTF curve
2.1.3 Static Diagonal resolution - MTF curve
2.1.4 Dynamic Horizontal resolution - MTF curve
2.1.5 Dynamic Vertical resolution - MTF curve
2.1.6 Dynamic Diagonal resolution- MTF curve
2.1.7 Graph of Samples/Frame vs Frame/Second rate

2.2 Chrominance spatial/temporal resolution
2.2.1 Static Horizontal resolution - MTF curve
2.2.2 Static Vertical resolution - MTF curve
2.2.3 Static Diagonal resolution - MTF curve
2.2.4 Dynamic Horizontal resolution - MTF curve
2.2.5 Dynamic Vertical resolution - MTF curve
2.2.6 Dynamic Diagonal resolution - MTF curve
2.2.7 Graph of Samples/Frame vs Frame/Second rate

2.3 Colorimetry Transfer Characteristic

2.4 Artifacts

2.5 Sync/Blanking/Subcarrier Modifications

2.6 Transient Response

2.7 Aspect Ratio

2.8 Use of Overscan/Underscan

2.9 Subjective Assessment of Overall Picture Quality

2.10 Ghost Canceling
- 2.10.1 Does the system incorporate a ghost canceling training signal?
- 2.10.2 Can the system incorporate a ghost canceling training signal?
- 2.10.3 If a training signal is incorporated please describe:
  - 2.10.3.1: Wave form shape
  - 2.10.3.2: Spectrum
  - 2.10.3.3: Repetition rate

3. ATV Audio Issues

3.1 Number of Channels

3.2 Modulation Scheme

3.3 Signal-to-noise Ratio (per channel) (dB)

3.4 Non-linear
- 3.4.1 Total Harmonic Distortion (THD)
- 3.4.2 Intermodulation Distortion

3.5 Channel Crosstalk (dB) (Audio/Audio, Video/Audio)

3.6 Audio/Video Delay (lip sync) (± ms)

3.7 Dynamic Range (dB)

3.8 Frequency Response (±dB)

3.9 Noise Reduction (if used)
- 3.9.1 Analog/Digital?
- 3.9.2 Noise Improvement (dB)
- 3.9.3 Bandwidth Requirement (Hz)

3.9.4 Artifacts of Noise Reduction
- 3.9.4.1 Non-Linear Distortion
- 3.9.4.2 Crosstalk (dB)
- 3.9.4.3 A/V Delay (ms)
- 3.9.4.4 Dynamic Range (dB)
- 3.9.4.5 Frequency Response (±dB)
- 3.9.4.6 Pumping
- 3.9 4.7 Any other artifacts

3.10 Companding/Compression (if used)
- 3.10.1 Analog/Digital?
- 3.10.2 Noise Improvement (dB)
- 3.10.3 Bandwidth Requirement (Hz)
- 3.10.4 Artifacts of Companding/Compression
  - 3.10.4.1 Non-Linear Distortion
  - 3.10.4.2 Crosstalk (dB)
  - 3.10.4.3 A/V Delay (ms)
  - 3.10.4.4 Dynamic Range (dB)
  - 3.10.4.5 Frequency Response (±dB)
  - 3.10.4.6 Pumping
  - 3.10.4.7 Any other artifacts

3.11 Audio Security (if available)
- 3.11.1 Analog/Digital?
- 3.11.2 Level of Security
- 3.11.3 Bandwidth Requirement (Hz)
- 3.11.4 Scrambling Techniques **(Rev.2)**
- 3.11.5 Artifacts of Security Technique
  - 3.11.5.1 Non-Linear Distortion
  - 3.11.5.2 Crosstalk (dB)
  - 3.11.5.3 A/V Delay (±ms)
  - 3.11.5.4 Dynamic Range (dB)
  - 3.11.5.5 Frequency Response (±dB)
  - 3.11.5.6 Any other artifacts

3.12 Encoded Audio Baseband and RF Spectrum

3.13 Stereo Separation

3.14 Subjective assessment by an expert panel **(Rev.2)**

4. Degradation of Compatible NTSC Audio (MTS)
   4.1 Intercarrier Audio

4.2 Audio/Video Delay (lip sync) (±ms)

5. Ancillary Signals
   5.1 Provisions for Ancillary signals
   5.2 Lines available for Ancillary signals in compatible NTSC signal

6. Terrestrial Transmission Issues
   6.1 Characterization of Compatibility
   6.2 Noise Susceptibility
   6.3 Susceptibility to Multipath or Echo
   6.4 Susceptibility to Interference on picture and sound **(Rev.2)**
      6.4.1 Adjacent Channel Interference
      6.4.2 Co-Channel Interference
      6.4.3 Airplane Flutter
      6.4.4 Impulse Noise
      6.4.5 Other

   6.5 Susceptibility to Group Delay Errors

   6.6 Susceptibility to Non-Linear Distortions

   6.7 Transmitter/Antenna Requirements
      6.7.1 Required Number of Transmitters/Antennas
      6.7.2 Complexity of Transmitter/Antenna
      6.7.3 Use of Present Transmitter/Antenna

   6.8 Bandwidth Requirements
      6.8.1 Near Term
      6.8.2 Long Term

   6.9 Transmission Field Testing
      6.9.1 At least one (1) location exhibiting average amount of difficulty, and **(Rev 2.)**
      6.9.2 At least one (1) location considered "difficult" **(Rev.2)**

   6.10 Coverage Relative to NTSC

   6.11 Gracefulness of Degradation
      6.11.1 Video
      6.11.2 Audio
      6.11.3 Audio vs Video

7. Suitability for Alternate Media Distribution
   7.1 Suitability for Cable Television Distribution

- 7.1.1 Channel Bandwidth
- 7.1.2 Co-Channel Interference
- 7.1.3 Adjacent Channel Interference
- 7.1.4 Interference To /From Other Services
  - 7.1.4.1 Navigation
  - 7.1.4.2 Amateur Radio
  - 7.1.4.3 FM Radio
  - 7.1.4.4 Citizens Band
  - 7.1.4.5 Industrial Band
- 7.1.5 Effect of Micro-Reflections
- 7.1.6 Intermodulation Distortion
- 7.1.7 Channel Loading
- 7.1.8 Cross Modulation Distortion
- 7.1.9 Composite Triple Beat Distortion
- 7.1.10 Second Order Distortion
- 7.1.11 Minimum C/N Requirements
- 7.1.12 Security System Issues
- 7.1.13 Propagation Delay
- 7.1.14 Compatibility with AGC of Distribution Systems
- 7.1.15 Peak Power
- 7.1.16 Frequency Accuracy
- 7.1.17 Sensitivity to Phase Noise

7.2 Suitability for Satellite Distribution

- 7.2.1 Baseband Video Bandwidth
- 7.2.2 Baseband Audio Bandwidth
- 7.2.3 Audio Bandwidth Requirement
- 7.2.4 Exciter Modifications
- 7.2.5 Uplink Power Requirements
- 7.2.6 Optimum FM Deviation
- 7.2.7 Minimum C/N
- 7.2.8 Minimum Antenna Size
- 7.2.9 Satellite Receiver Requirements
  - 7.2.9.1 Clamping
  - 7.2.9.2 De-emphasis
  - 7.2.9.3 IF Bandwidth
- 7.2.10 Compatibility with Satellite Security Systems
- 7.2.11 FM Channel Artifacts

7.3 Suitability for Other Terrestrial Distribution Systems

- 7.3.1 Amplitude Modulated Links (AML)
- 7.3.2 Frequency Modulated Links (FML)
- 7.3.3 Microwave Distribution Service (MDS)
- 7.3.4 Multi-Channel MDS (MMDS)